

Update on Research and Technology Development at KSC

September 27, 2010

Since the release of the President's Budget in February of 2010, many KSC employees have participated as members of Agency-level strategic activity teams with the goal of working towards the formulation of new NASA Research and Technology Programs. These teams are creating 20-year outlook technology roadmaps for 15 different technology areas. The plans derived from the teams will provide overall recommendations and guides for technology strategies and priorities across all of NASA's technology investments.

The KSC Engineering Directorate (NE) is playing an integral role in this process. For example, Greg Clements (NE) is chairing the Ground and Launch Systems Processing Team. Other teams with KSC representatives include:

- Launch Propulsion Systems (TA1)
- Space Power and Energy Storage Systems (TA3)
- Communication and Navigation Systems (TA5)
- Human Exploration Destination Systems (TA7)
- Modeling, Simulation, Information Technology and Processing (TA11)
- Ground and Launch Systems Processing (TA13)
- Thermal Management Systems (TA14)

In addition to participating on Agency-level strategic activity teams, individuals from KSC have also been involved in planning for future programs and projects. For example:

Exploration Robotic Precursors Program

The Exploration Robotic Precursors Program (xRP) is in formulation, pending the outcome of the FY11 President's budget request. KSC hopes to lead the development of an In Situ Resource Utilization (ISRU) payload to either characterize lunar volatiles or demonstrate oxygen production from the lunar regolith. KSC will be launching all xRP missions via the Launch Services Program (LSP).

Habitation Demonstration Unit

The Deputy Project Manager for the Habitation Demonstration Unit (HDU) requested potential KSC technology contributions and funding strategies for FY11 HDU campaign involving the evolution of current technology efforts. This includes communications, food production, electrodynamic dust shield, and LED lighting; as well as new technology efforts/pathfinders for the Inflatable Habitat Flagship, e.g. smart self-healing wiring and intelligent devices for instrumentation.

The Exploration Technology Development and Demonstration Program/ Human Exploration Framework Team

The Exploration Technology Development and Demonstration (ETDD) program has been modifying formulation plans to more closely align with the Senate version of the appropriations bill and also the priorities of the Human Exploration Framework Team (HEFT).

The top priorities of HEFT were identified as cryogenic propellant storage and transfer, radiation protection, suitports and improved suits, improved environmental control and life support systems (ECLSS), and human robotic systems.

The sustaining capabilities of HEFT, although not needed immediately, were identified as In Situ Resource Utilization (ISRU), Entry, Descent, and Landing (EDL), nuclear power and software systems.

HEFT options to keep open in the trade space, pending further refinement of human spaceflight architectures, were identified as solar electric power and LOX/RP propulsion.

The Cryogenic Propellant Storage and Transfer

The Cryogenic Propellant Storage and Transfer (CPST) domain and Life Support and Habitation Systems (LSHS) domain received plus-up funding, while the ISRU Lunar Volatiles Characterization demonstration project and domain received funding reductions. The scope of work at KSC was increased in regards to the LSHS project in the area of solid waste management. The current scope of work includes atmosphere revitalization (trace contaminant control), water recovery (wastewater storage and biocide/antimicrobial technology), and food production activities.

The CPST project has redirected the majority of project funding to technologies needed to help enable the Flagship CRYOGENIC Propellant Storage and Transfer (CRYOSTAT) Mission.

KSC funding was reduced as many of the tasks, including liquid transfer -metal foam heat exchanger development, were deferred to FY12.

For details about the NASA Flagship Technology Demonstrations' CRYOSTAT mission, review Stephan Davis' presentation at:

[HTTP://WWW.NASA.GOV/PDF/458814MAIN_FTD_CRYOGENICPROPELLANTSTORAGEANDTRANSFERMISSION.PDF](http://www.nasa.gov/pdf/458814main_FTD_CRYOGENICPROPELLANTSTORAGEANDTRANSFERMISSION.PDF)

KSC participation in the Autonomous Systems and Avionics domain and Human Robotic Systems domain remains unchanged.

KSC Desert RATS

KSC personnel have been in the Arizona desert participating in NASA's Desert RATS – or Research and Technology Studies – field-testing from Aug. 31 through Sept. 15, 2010.

The Desert RATS tests offer a chance for a NASA-led team of engineers, astronauts and scientists from across the country to come together to conduct technology development research. The location offers a good stand-in for future planetary exploration mission destinations. The team demonstrates and tests NASA hardware, e.g. Space Exploration Vehicles, Habitat Development Unit, Tri-ATHLETES, Centaur 2, Portable Utility Pallets (PUP), and a suite of new geology sample collection tools.

For more details about Desert RATS visit: http://www.nasa.gov/exploration/analog/desert_rats.html